MINNESOTA ECONOMIC

# TRENDS

## HIRING DIFFICULTIES IN MANUFACTURING

### WHERE ARE THE PRESSURE POINTS?

SEPTEMBER 2019

EMPLOYMENT AND ECONOMIC DEVELOPMENT

# Are We Ready for What's Next?

In Minnesota, we have so much to be optimistic about – our diverse economy, a strong business climate, and an extraordinary workforce founded on values of hard work and integrity.

Yet no one would say that the growth of Minnesota's economy is inevitable. We have a severe workforce shortage, well documented by DEED's Labor Market Information Office. Many communities face barriers to employment, and the fast-changing global economy requires that we ask ourselves if we're ready for what's next.

Here's what's next in Trends:

Hiring Difficulties in Manufacturing, by Alessia Leibert, summarizes employer interviews on hiring skilled production, repair and engineering technicians in manufacturing. One goal of the survey is to identify if skilled manufacturing jobs are difficult to fill because of a skills gap or demand-side reasons. From what we're seeing, and you'll soon discover, employers will have to strengthen on-the-job training partnerships with local schools to bridge skills gaps.

In Connecting Students and Educators to Labor Market Information, Luke Greiner introduces a new tool to help connect local labor market information to the Career Wheel that high schools and colleges around the state use. The Career Pathways Tool is designed to help our schools help all students make career decisions that keep the economy in mind.

David Senf explains how diffusion indexes measure the dispersion of employment change across industries and what it means for the economy. In a second article, he provides an analysis of the similarities and differences between the current economic expansion and previous expansions. In July, the current expansion, which started in June 2009, became the longest of the 11 post-World War II expansions.

Finally, Sanjukta Chaudhuri gives a brief overview of the state's construction industry in 2019. The general outlook for the industry is positive, but construction is vulnerable to business cycles; the level of construction activity is an important early indicator of economic conditions. Like manufacturing, construction needs to find strategies to diversify its workforce.

Carol Walsh

**Carol Walsh**
Editor

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Alessia Leibert

# Hiring Difficulties in Manufacturing

*As hiring in manufacturing outpaces the number of applicants, employers are ramping up investments in training and retention strategies.*

According to results from the 2019 Minnesota Hiring Difficulties Survey, 62 percent of job vacancies in skilled production occupations posted by manufacturing firms in 2018 were difficult to fill. The study identifies which skills are in need, other barriers besides lack of skills contributing to hiring difficulties, and which actions taken by employers were most effective at addressing the problems.

The first section of this article provides an overview of the magnitude and distribution of hiring difficulties. The second section takes a closer look at the nature and potential causes of hiring difficulties and, specifically, at the incidence of skills gaps. The third section looks at specific conditions under which hiring difficulties are most likely to arise. The fourth section explores what employers are doing to address hiring difficulties. The fifth section presents the methods preferred by employers to train their workforces, with the aim of pinpointing best practices for mitigating skills gaps. The final section provides a summary of findings from the survey and policy implications.

## Overview of hiring difficulties in Minnesota

Hiring difficulties varied widely by occupation. CNC Machine Tool Programmers had the highest incidence, at 96 percent, and Electrical/ Electromechanical Engineering Technicians

### 2019 Minnesota Hiring Difficulties Survey Design

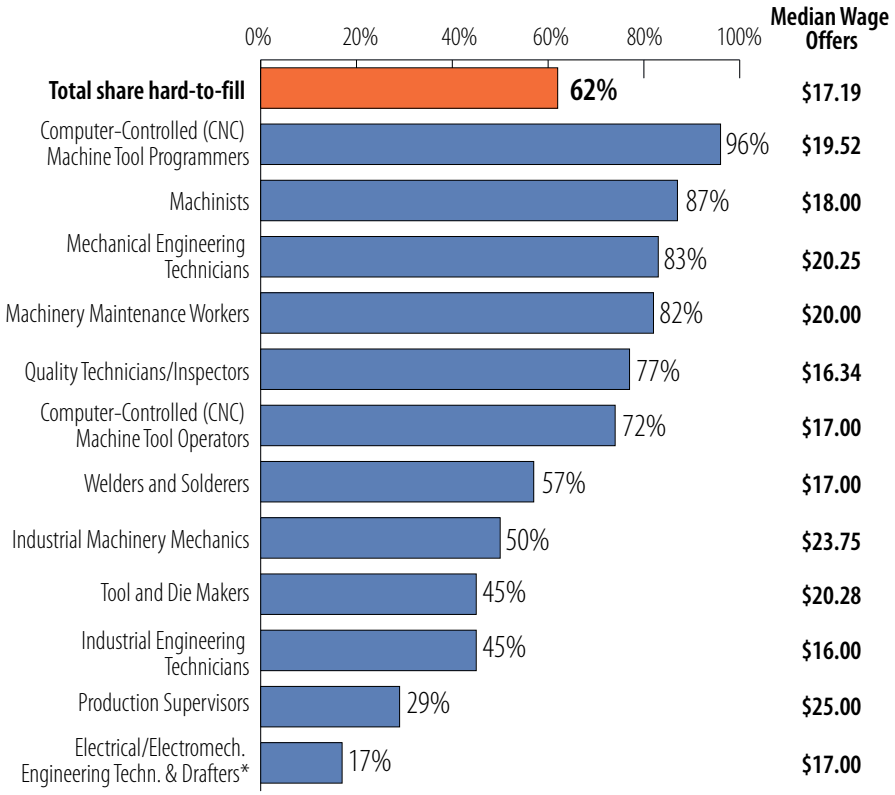
This study leverages spring 2018 Minnesota Job Vacancy Survey results. A subset of reported vacancies was selected for further study based on occupation and industry. For all selected vacancies, the research team made follow-up phone calls to employers to ask about their experiences filling these vacancies. In total, 146 establishments out of the 217 sampled responded to the follow-up survey, representing a 67 percent response rate and about 1,072 estimated vacancies.[1] All the data cited in the article, including all graphs and tables, are from the 2019 Minnesota Hiring Difficulties Survey.

[1]Results and detailed methodology from previous rounds of the survey are available on DEED's website at https://mn.gov/deed/data/lmi-reports/hiring-difficulties-mn/ Comprehensive information about the JVS methodology is available at https://mn.gov/deed/data/data-tools/job-vacancy/jvs-methodology.jsp .

and Drafters had the lowest incidence, at 17 percent (Figure 1). The chart also shows median wage offers by occupation. These wages refer to 2018, and we heard from respondents that they have increased since then.

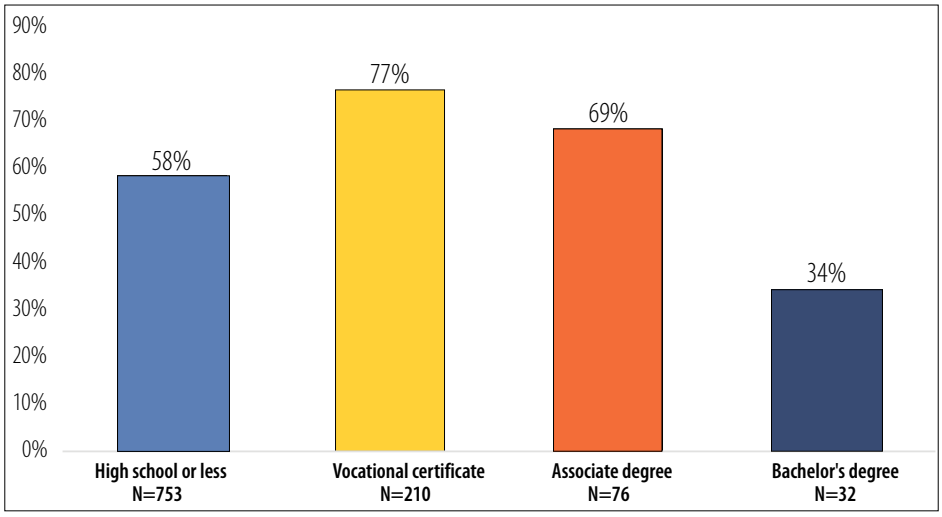
Seventy percent of the estimated vacancies in skilled production required only a high school diploma. Of these, 58 percent were difficult to fill, representing the largest pool of hard-to-fill vacancies in terms of sheer size (Figure 2). In terms of concentration, however, vacancies requiring a vocational certificate had the highest incidence of hiring difficulties at 77 percent. Vacancies requiring a four-year degree were both the smallest group and the least likely to be hard to fill (34 percent). These results show that, in general, the educational requirements of these jobs, alone, are not driving hiring difficulties.

**Figure 1. Percentage of Hard-to-Fill Vacancies by Occupation**




*This group combines the following occupations: SOC 173013 Mechanical Drafters; SOC 173023 Electrical and Electronics Engineering Technicians; SOC 173024 Electro-Mechanical Technicians.

**Figure 2. Percentage Hard-to-Fill Vacancies by Education Requirement**



Hiring difficulties also varied considerably by industry (Figure 3). One possible factor driving these differences is the technological intensity, or STEM-relatedness, of the industry.[2] Non-STEM industries appear more prone to hiring difficulties, especially primary and fabricated metal products (81 percent hard to fill) and food, printing, and textile products manufacturing (70 percent hard to fill). In contrast, STEM sectors are less likely to experience hiring difficulties.

## Employer perceptions

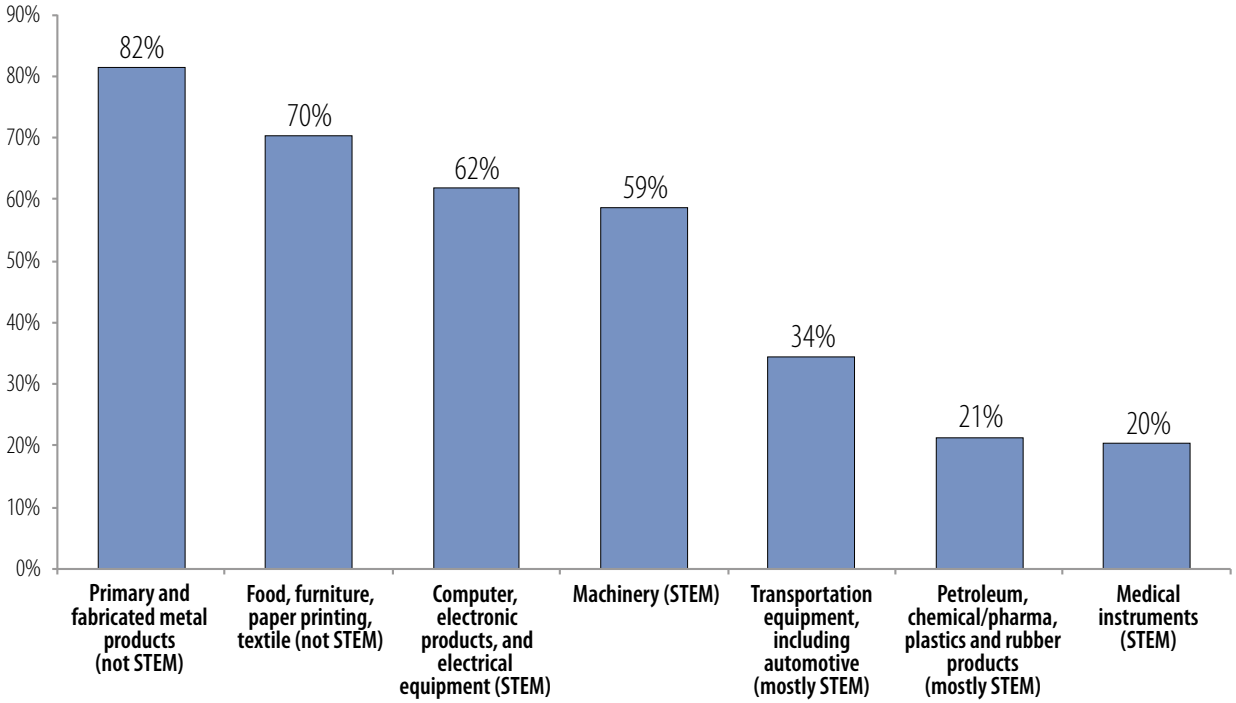
If too few applicants have the skills, knowledge, or experience to qualify for a position then we can say there is a gap, or mismatch, between workers' skills (supply) and the skills needed to perform the job (demand). On the other hand, there are a variety of reasons an employer may have difficulty hiring, and many of these have little to do with the available supply of qualified workers. Characteristics of the firm and/or the job itself could reduce the likelihood that candidates will choose to apply for or accept a position.

To determine how many cases of hiring difficulties are specifically attributable to skills mismatches, employers were asked to identify the reasons for their difficulties by choosing either:

1. Hiring difficulties caused by a mismatch between job requirements and the training, skills, and/or experience of applicants (skills gaps); or

2. Hiring difficulties caused by undesirable job or firm characteristics such as wage offers, hours and location of work, ineffective recruiting, and so forth (demand-side factors).

**Figure 3. Percentage of Hard-to-Fill Vacancies by Industry**




[2]The Bureau of Labor Statistics (BLS) defines high-tech industries as those having high concentrations of workers in science, technology, engineering, and mathematics (STEM) occupations. Our definition also includes industries with a high level of spending in research and development.

Figure 4 summarizes employers' responses. Of the 62 percent of hard-to-fill vacancies, one-fourth (21 percent) were attributed exclusively to undesirable job characteristics or ineffective advertising strategies (demand-side factors), while 16 percent were attributed exclusively to a lack of skills, experience, or credentials in candidates (skills gaps). Sixty percent of hiring difficulties were perceived as being caused by a mix of skills gaps and demand-side factors. The remaining 3 percent was attributed primarily to applicants' lack of work ethic or lack of interest for a career in manufacturing.

Pure skills mismatches – difficulties where employers did not also identify a demand-side problem – account for merely one-sixth of all hiring difficulties, or about 10 percent of vacancies in skilled production occupations.

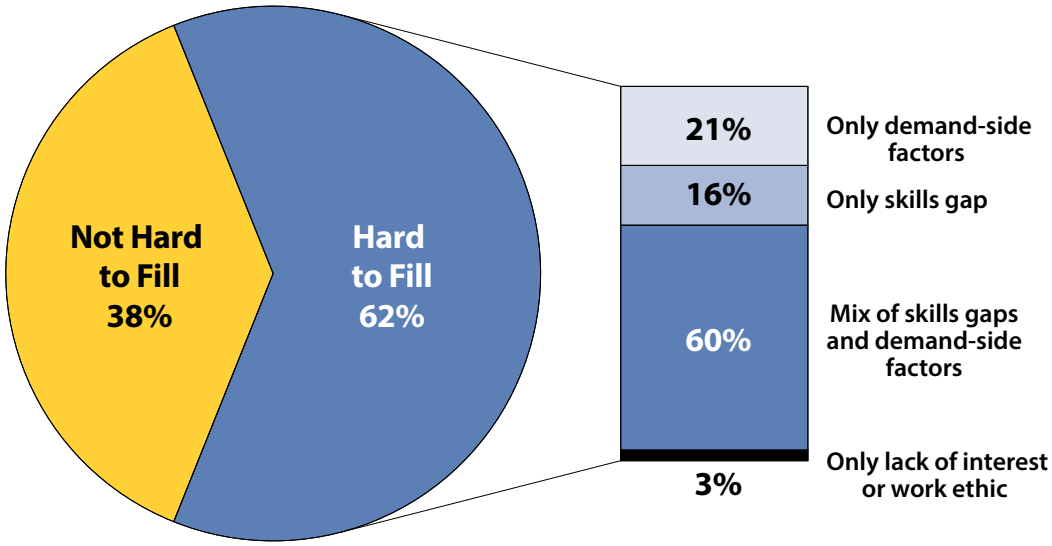
When demand-side factors were cited as a problem, undesirable shifts and uncompetitive wages were the biggest barriers, affecting 49 percent and 40 percent of responses respectively, followed by location and ineffective advertising. The following quotes from respondents illustrate these points:

*"If I had first-shift spots open, I'd be able to fill those."*

*"Our proximity to the Twin Cities metro area causes us to lose some applicants because we can't afford to pay what they are probably getting in the cities."*

*"When we find a person who is qualified we will hire them the next day. But these people have gone to competitors and they will take the best offer at other manufacturers. Maybe we aren't the best offer.*

**Figure 4. Factors Perceived by Employers as Contributing to Hiring Difficulties**



*Maybe others offer more perks, a location closer to where they live, maybe a different shift, maybe hours that are more flexible, maybe they don't like the start time and the end time so they can take the kids to school in the morning and then come to work."*

*"We are in Eden Prairie. There is limited public transportation Monday through Friday and none on the weekends, and we are trying to hire a night shift and weekend shift."*

*"The work environment in our facility is not desirable because it is not air conditioned, not in a clean room, and workers need to stand. And the shift is 6 a.m. to 4:30 p.m."*

*"All we use is MinnesotaWorks and several temp agencies. We don't have active headhunters or recruiters. There is quite a bit that could be done to advertise, but we aren't doing. We are a relatively small company."*

When skills mismatches were cited as a problem, two main issues emerged: inadequate hands-on training on the job and lack of a post-secondary credential. We found some evidence of gaps in post-secondary training offerings, specifically in tool making. The disappearance of vocational and technical training from high school is also a big concern. However, employers make it very clear that the skills they are looking for are groomed through years on the job. This means that, unless post-secondary training is tailored around the individual needs of employers, lack of experience could still be a barrier to hiring even if candidates have good educational credentials. Below are some illustrative comments from respondents:

*"The products we make require very high-quality welding. It's not necessarily a certification or education, it is the quality of the weld they are able to perform that matters when we hire."*

*"What most applicants went to school for isn't really going to apply. Their knowledge at a competitor makes more sense because our system is not a common software."*

*"The quality control inspector job requires specialized experience more than any type of degree. The specialized experience is developed here as an operator. When we can't hire from within we want external candidates to have a minimum of over a year of experience."*

*"They have to troubleshoot and do a lot of diagnostic work on these machines, and we have over 200 machines. It takes someone very well rounded to get the machines up and running in a timely manner. It also takes a very independent worker."*

*"Local colleges used to have a program for tool and die making, but not anymore because people are not interested."*

The need to hire someone with prior work experience inevitably restricts the size of the candidate pool and creates fierce competition among manufacturers for candidates.

In terms of skills set, by far the biggest gap identified in job applicants is general mechanical aptitude, sometimes as basic as the ability to use hand tools such as a drill or a screwdriver. Respondents characterized this gap as generational: younger generations have not grown up tinkering and fixing things as a hobby like older generations. An upcoming Trends article will provide more specific information on the skills and qualifications employers identified as most difficult to find.

We also asked employers whether the *quantity* of the job applications received played any role in their hiring difficulties. This problem impacted 68 percent of hiring difficulties. When a job opening did not draw enough applicants, 10 or fewer in most cases surveyed, the root causes are often traceable to undesirable job characteristics, or a combination of skills gaps and undesirable

job characteristics. In a tight labor market, each aspect of the job can become a competitive factor in the talent race. As a result, firms that do not do enough to sweeten their offers or to highlight their advantages might draw fewer applicants. Here are some examples respondents provided:

*"The pool of qualified candidates goes down significantly when the position is a second or third or weekend shift."*

*"There are so many more opportunities out there, and the work here is a bit dirtier. Also, we were looking for candidates with mechanical aptitude."*

*"You almost can't hire for maintenance mechanics. You have to grow and train them within. They need to have experience with industrial manufacturing equipment, conveyors, motors, and controls. More are aging out than coming into the field. Furthermore, the position we are trying to fill is the night shift, and we are located in a small community. We received only one application."*

*"We brought in an outside agency to help us with some advertising and rebranding a campaign for us because last fall we saw a drop in applicants."*

To further add to the complexity of the hiring difficulties phenomenon, 52 percent of employers agreed that their difficulties could be related to candidates' lack of work ethic or interest. The examples cited by respondents included lack of interest in the work, low attendance often due to unwillingness to work a late shift, failure to pass a background check, and high wage expectations.

In today's tight labor market the supply of workers for production jobs has not kept pace with demand. However, survey results show that hiring difficulties cannot automatically be equated with a skills shortage. Augmenting the skill level of the workforce is only part of the solution *in the absence of measures that also remove the barriers* that employers themselves recognize as disincentives to apply for their positions.

## Factors driving hiring difficulties

In this section we analyze the impact of firm and job characteristics on hiring difficulties. Besides occupation and industry, mentioned in Figures 1 and 3, factors such as firm size, firm location, turnover, and the STEM-relatedness of an industry have the strongest effects on the probability of a vacancy being hard to fill (Table 1).

The influence of each factor is explained below.

**Firm location**: Sixty-eight percent of production vacancies in Greater Minnesota were hard to fill compared with 58 percent in the Twin Cities. Distance from the metro area and rural versus urban location do not explain this difference. As shown in Figure 5, Central Minnesota – primarily urban and close to the Twin Cities – experienced significantly more hiring difficulties (95 percent) compared with rural Southwest Minnesota (59 percent). The explanation is probably that firms in Central Minnesota experience competition from both local and Twin Cities manufacturers.

**Firm size**: Vacancies were more likely to be hard

**Table 1. Comparison of Hard-to-Fill and Not-Hard-to-Fill Vacancies by Firm and Job Characteristics**

| Factor | Categories | Percent Hard to Fill |
|---|---|---|
| Firm Location | Metro Area | 58% |
| | Greater Minnesota | 65% |
| Firm Size | Small: Less than 56 employees | 71% |
| | Medium: 56-249 employees | 61% |
| | Large: 250 or more employees | 54% |
| Experience Requirements | No experience required | 67% |
| | Experience of less than three years | 60% |
| | More than three years of experience | 61% |
| Education Requirements | High School diploma or less | 58% |
| | Vocational certificate or Associate degree | 75% |
| | Bachelor's | 34% |
| Training Indicator | Yes, the firm offered structured OJT or apprenticeship over the last 12 months | 56% |
| | No, the firm did not offer structured OJT or apprenticeship | 76% |
| Turnover Indicator | Yes, there was turnover in this position for reasons other than retirements | 76% |
| | No, there was no turnover in this position except possibly because of retirements | 34% |
| STEM-related Industry Indicator | Yes | 45% |
| | No | 73% |
| Position offers Retirement, Health Care, or PTO Benefits | Yes | 61% |
| | No | 78% |

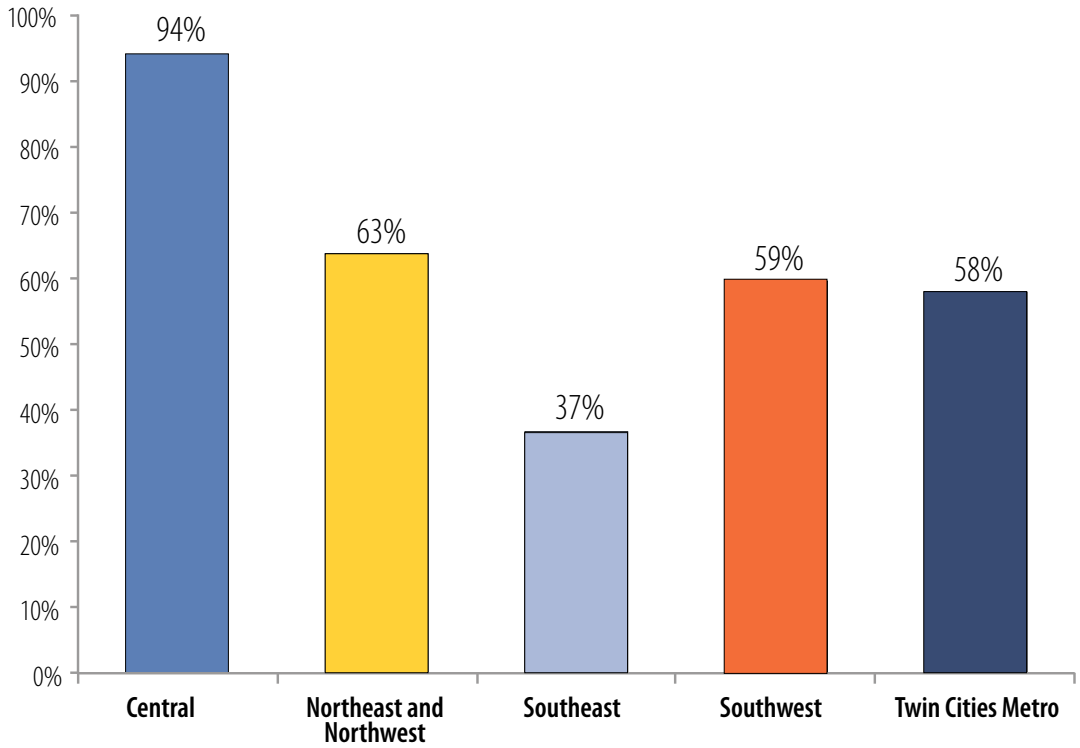
The regression model was able to correctly predict the presence (or absence) of a hiring difficulty in 88 percent of cases, with a Nagelkerke R Square of .680. The regression model is included in the full research report available at mn.gov/deed/data/lmi-reports/hiring-difficulties-mn/

to fill in small firms (fewer than 56 employees) compared with medium and large firms (56 employees and over).

**Delivery of on-the-job training (OJT)**: Seventy-six percent of firms that did not offer structured training had difficulties filling production vacancies compared with 56 percent that did offer training. A possible explanation is that firms that lack the capacity to deliver training to new hires also lack the flexibility to hire inexperienced candidates. The significance of this factor in reducing the likelihood of hiring difficulties persists even when all other characteristics listed in Table 1 are controlled for. Therefore, OJT emerges from this analysis as a potentially effective method to prevent hiring difficulties in a variety of contexts, including smaller-sized firms.

**Education and experience level**: Table 1 shows that hiring difficulties were more common in vacancies requiring a vocational certificate or associate degree (75 percent) followed by a high school diploma (58 percent). However, Figure 6 reveals that only 16 percent of hard-to-fill vacancies were truly entry-level, requiring no education and no experience. The largest group, 32

**Figure 5. Percentage of Hard-to-Fill Vacancies by Region**



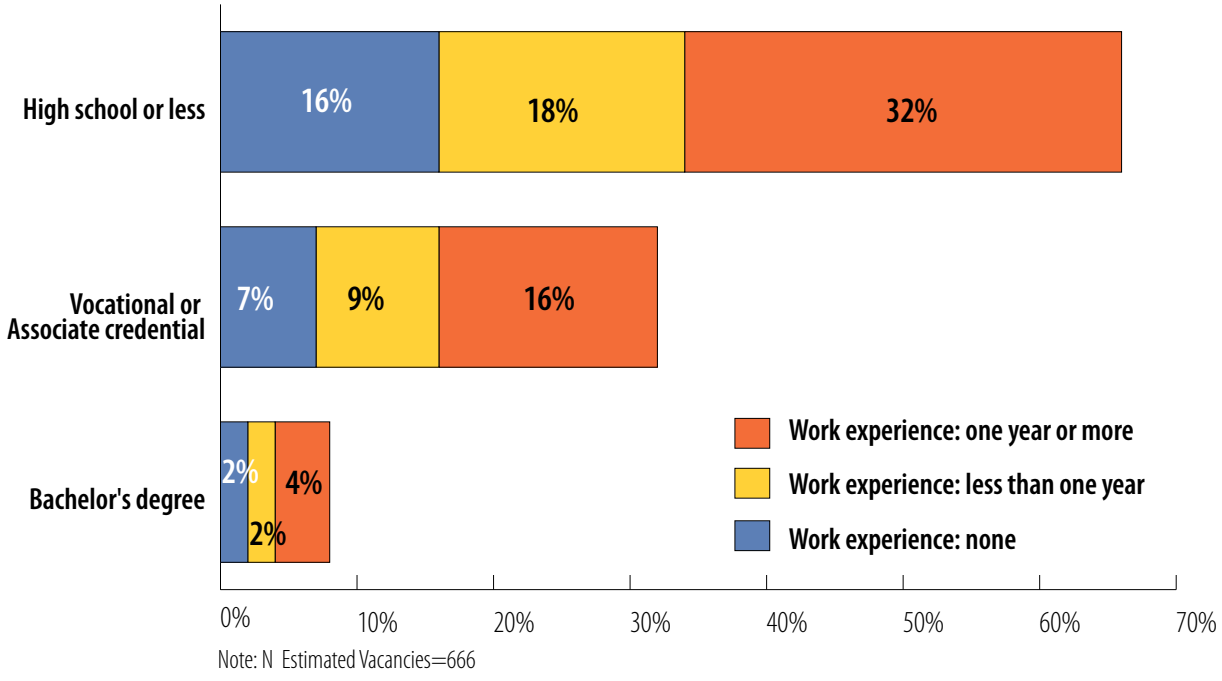
percent of hard-to-fill positions, needed more than one year of experience at a minimum. Employers seem to be responding to a tight labor market by lowering required education and substituting it with highly specific experience requirements.

Expecting high-school educated candidates to bring a mid-level skill set, typically developed through technical post-secondary schooling or specialized on-the-job training, clearly presents a challenge for employers.

**STEM-related industry:** The incidence of hiring difficulties was higher in industries with low concentrations of STEM workers, at 73 percent, than in industries with high concentrations, at 45 percent. Employers' open-ended responses suggest that low-tech firms face competition from high-tech firms for talent, often for the simple reason that the "perceived coolness" of a product is a driver in deciding where to work. Despite the fact that many jobs in low-tech manufacturing have become just as technology-intensive as others in the industry, misconceptions can be hard to eradicate. Furthermore, this indicator probably captures differences in the physical comfort and safety of facilities. Employees in low-tech manufacturing might be exposed to uncomfortable temperatures, odors, dirt, or toxic substances depending on the industry.

**Turnover**: Three out of four vacancies in positions that had turnover were hard to fill, more than twice as high as among non-turnover vacancies at 34 percent. This could stem from the fact that firms with greater turnover need to do more hiring in general. Another explanation is that turnover and hiring difficulties share common causes. The most frequently cited causes of turnover are low wages, uncomfortable working conditions, undesirable

**Figure 6. Hard-to-Fill Vacancies by Education and Experience Requirement**




Note: N Estimated Vacancies=666

work shifts, and lack of flexibility in work hours.

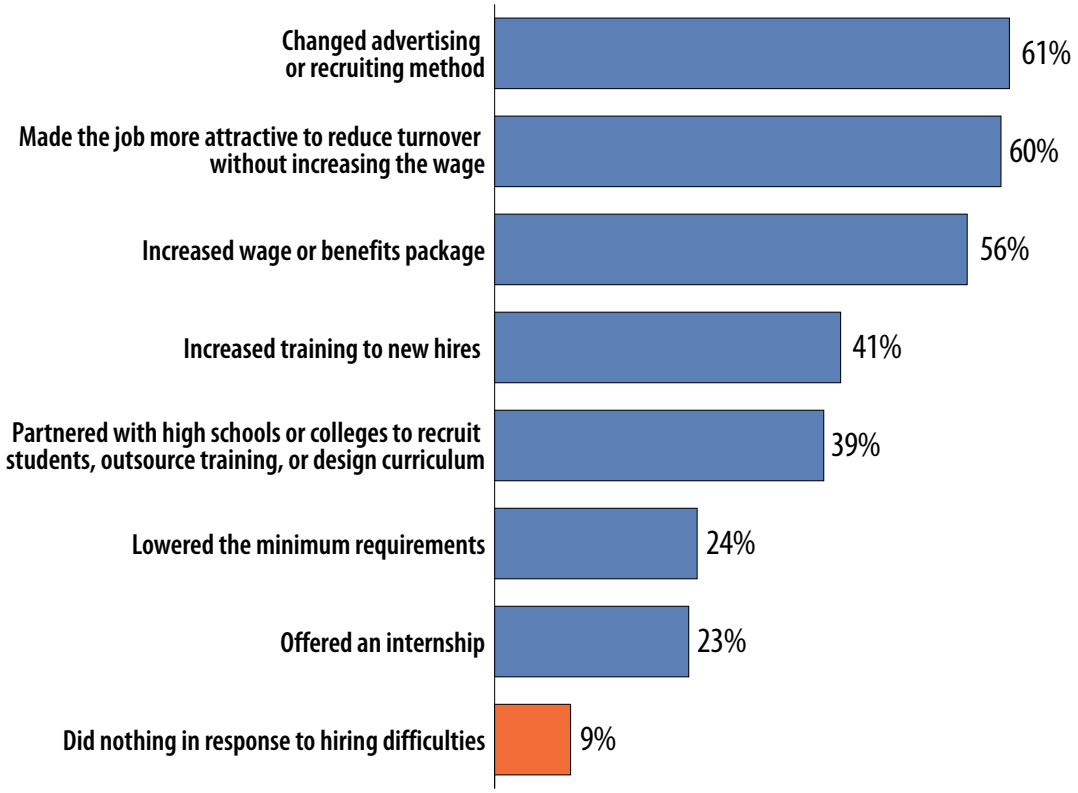
**Benefits indicator**: Vacancies that offered retirement, health care benefits or paid time off were less difficult to fill (61 percent hard to fill) than those that did not (78 percent hard to fill). Furthermore, all seasonal and temp positions were hard to fill, clearly demonstrating that job quality characteristics are important recruiting tools especially in tight labor markets.

In conclusion, we found measurable evidence of demand-side effects on hiring difficulties. In particular, the significance of turnover, benefits, and STEM-relatedness of an industry could indicate a causal relationship between undesirable job characteristics and recruiting problems. We also found a strong relationship between skills and hiring difficulties, demonstrating that skills gaps are present especially at the middle of the skills range. The variation in hiring difficulties across education requirements, occupation, industry and geographic location shows that one size does not fit all. Workforce development practitioners and policymakers must develop targeted interventions.

## How are employers addressing hiring difficulties?

The practical steps taken by employers in response to hiring difficulties tell us a great deal about what they believe to be the nature of their challenges and the most effective solutions. Figure 7 shows that the most popular strategy, adopted in 61 percent of cases, is changing advertising or recruiting. Employers who chose this response felt that

**Figure 7. Actions Taken by Employers to Overcome Hiring Difficulties in Manufacturing**




Percentages add up to more than 100% because respondents could select multiple answers

traditional advertising through job banks is not effective at reaching people already employed or who would not naturally think of manufacturing as a career. Today's tight labor markets require more innovative and broad-reaching strategies, such as Facebook campaigns or making connections with schools to promote these careers.

The second and third most popular strategies entail making the job more attractive with or without increasing the wage. These efforts include boosting benefits packages, offering more flexible and part-time work schedules, and creating opportunities for internal advancement. The following quotes give an idea of the variety of steps taken.

*"Flexibility is a major benefit here, and this sets us apart from some of the other companies. We don't penalize people if their kids get sick or their car won't start. We offer flextime to make up the hours."*

*"We introduced paid parental leave and added sick leave separate from our vacation."*

*"We reduce mandatory overtime when we can to prevent turnover."*

*"We started giving our employees more opportunities to advance their skills by getting them on new product/new machines so they aren't doing the same machine or same parts every day."*

Manufacturing provides a pay advantage compared to other sectors. The area where manufacturing has not kept pace is in work schedules, so adding flexibility can go a long way toward preventing recruiting and retention difficulties.

The fourth most frequent response, impacting 41 percent of hiring difficulties, is to increase training for new hires. As the labor market tightens and competition among firms for qualified workers increases, employers are clearly more willing to hire inexperienced candidates and then address their skills gaps internally, shifting from a "buying" to a "making" approach to skills formation. This option is also very well suited to address skills-related hiring difficulties. Here are some examples of actions taken by employers:

"*[Machining and CNC Programming] require years of experience to become effective and efficient, so we have a small number of employees going through our apprenticeship program."*

*"We increased the training because we had to broaden our candidate pool by lowering the bar of the skills that we required. We've hired interns that have no work experience from high school, we've hired interns from the local college, we've hired people who are interested in welding and paid for their training."*

*"We couldn't find anybody. So we hired someone internally who was a Machinist, then hired someone to come in and train him so he could become a CNC Programmer."*

*"We had to drop the CNC experience and we have had to do our own training in-house in order to get candidates in the door. We also team up with two local colleges, and an instructor from the college comes in to train."*

These examples show a high degree of awareness on the part of employers that offering training and promotion opportunities enhances their ability to hire and groom the specific skills needed.

Many respondents who do not provide OJT expressed the desire to take action but cited barriers such as the cost of delivering the training, lack of interest for the opportunities offered, and competition from other employers who "steal" workers who receive training.

*"Most high schools do not offer vo-tech programs. Most tech colleges do not offer classes/programs for Tool Makers. A company could address the problem by hiring someone with a CNC degree and train them to make tools. We can't compete with them."*

*"I would pay for someone to take welding classes at the local technical college and I would also offer an apprenticeship program if anyone was interested in working for us, but there isn't anybody. I don't know what we can do for that other than immigration."*

*"When we get kids with post-secondary degrees we actually have to start training them from square one. They don't know the difference between a standard screwdriver and a Phillips. They expect us to teach them so in a couple of years they can go somewhere else with more experience for more money. I now understand why firms move to automation."*

*"Competitors like to steal my people because no one else is spending the time and effort to talk to high school kids and get them internships. And we actually spent time training our trainers so they could provide college-level applicable training on our equipment to those new hires. We do it ourselves hoping to retain them, but if they leave us for a competitor we become the best trainers for other companies."*

This is a "tragedy of the commons" situation: the whole manufacturing sector would be more productive if every firm delivered internal training to broaden the pool of qualified workers, but individual companies believe they would be better off shifting the cost of training to their competitors. This perpetuates the problem by discouraging firms from devoting sufficient resources to building their pipeline internally.

The next most common strategy to overcome hiring difficulties involves partnering with local high schools or colleges, typically by recruiting on campus or offering student internships. Least common are partnerships around curriculum development. The reluctance to collaborate on curriculum design has many possible explanations. First, most critical competencies are firm-specific, often machine-specific, and not teachable outside of the company. Second, the technological landscape and the skills needed to harness new manufacturing technologies are evolving at an extremely rapid pace, making it hard for the educational system to keep up. Third, there is concern that working closely with schools will reveal too much about their technology to competitors or that applicants with a post-secondary credential will demand higher wages.

Whatever the underlying reasons, high schools and post-secondary schools are underutilized sources of new talent. The lack of cooperation with schools on what should be included in a well-rounded curriculum, both at the high school and post-secondary level, is likely to lead to dissatisfaction with the quality and quantity of applicants.

Other actions taken by employers include lowering requirements of the position (24 percent) and offering internships (23 percent).

One last strategy worth mentioning is making investments in automation to replace human labor in response to hiring difficulties. Of the occupations surveyed, CNC Machine Operators and Maintenance Technicians are less in demand because of automation. For example, one surveyed firm introduced robotic welding which increased productivity and eliminated the third shift, while another installed computer systems into machines so operators only need to punch keys. However, automation is not necessarily a job killer. It can lead to redesigning a role rather than eliminating it. For example, machining and CNC machining jobs are becoming more highly skilled, requiring an understanding of production methods and processes, programming, properties of materials, as well as strong problem-solving skills.

## No hiring difficulties?

Most firms that averted hiring difficulties did so by promoting from within. This was achieved by building an internal pipeline of entry-level employees through methods that include enhancing internal training, adding internships or trainee positions to create a pool of pre-qualified candidates, and improving retention by developing career paths and increased employee engagement. Here is how one respondent described the multi-pronged approach:

*"We have enhanced our training program, not with online training but with in-person, which is always the best and ensures that progress is being closely monitored. We have created job evaluations for all the machines here to help an employee learn. Our internal training lasts four to six months. We also partnered with schools: we offer a lab internship for college students to come and work here in the lab over the summer. We also have year-round mentoring and coaching because we want to help people succeed. Employees regularly meet with their supervisor or plant division manager. If someone needs coaching or help we follow up to let them know that we care. Follow up is so important. Probably one of the main reasons people leave is because they think no one cares. I would hope that no one here feels that way."*

Finally, one employer found a solution to recruiting problems by hiring Somali and Liberian immigrants who are willing to work late shifts and can refer other people from the immigrant community to work for the company.

## What are employers doing to train their workforce?

Given the importance employers attribute to skills learned on the job, this section documents what firms are currently doing to develop skills internally. These best practices can help employers bridge skills shortages before they turn into full-blown hiring difficulties. Figure 8 shows the types of training that employers reported delivering over the last 12 months, regardless of whether they experienced hiring difficulties.

The most common type of training is formal in-house OJT. After deep cuts in training budgets during the Great Recession when skilled labor was abundant, employers have ramped up investments in their internal pipelines. However, the effectiveness of OJT also depends on its length and content. Length of training varies greatly, from two weeks to more than one year, and this variability likely leads to different outcomes. Apprenticeships, the longest and most structured form of workplace training, are offered only by 20 percent of respondents.

The second most common skill-building method, mentioned by two out of three surveyed firms (65 percent), is short-term off-the-job training, mostly for certifications in welding, forklift operator, and boiler operator, typically lasting less than two weeks.

Perhaps the most interesting trend is the share of firms, 44 percent, that offer college tuition reimbursement to their existing employees or new hires. The most comprehensive kinds of reimbursement cover tuition, books and tools. This opens up great opportunities for Minnesota youth to obtain a college credential debt-free and for firms to attract young people who otherwise could not afford to earn a degree or would not have thought of manufacturing as a career. Yet employers lament the fact that too few people take advantage of these incentives.

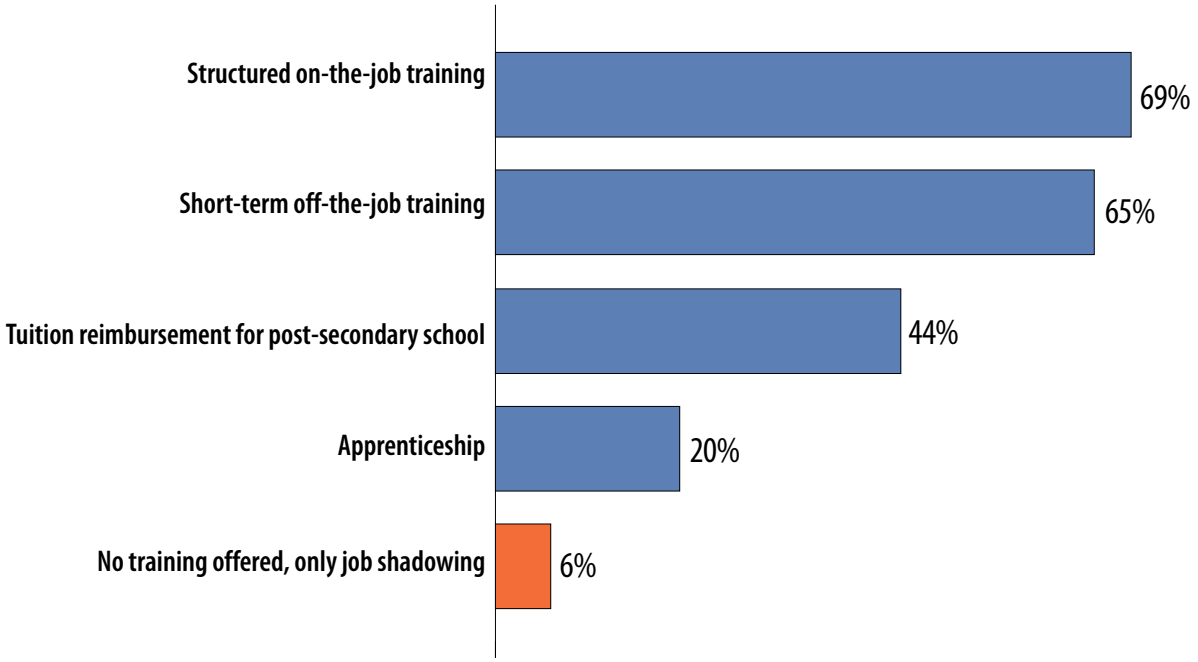
Only 6 percent of surveyed firms did not implement any of the strategies discussed here and relied exclusively on job shadowing or other very informal methods to train new hires.[3] For most employers, the best practices for addressing talent shortages focus on a combination of internal and external training. In particular, 44 percent of firms offered both OJT and tuition reimbursement for post-secondary schooling. The most effective

models are based on collaborations between educators, students and employers to provide classroom training and OJT at the same time (dual training). It is a win for all stakeholders: employers offer some tuition reimbursement or sponsorship in exchange for participants promising to work for the firm during the program and after graduation; participants obtain affordable college-level training and the guarantee of a job; and local colleges strengthen the quality of their instruction especially when employers provide the schools with the kinds of machines on which graduates will work.

The following quotes show the variety of initiatives and why employers believe them effective:

*"Since we can't find the skills needed to be a technician, we have an internal apprenticeship program that will teach an operator to become a technician. We have a documented training process for that apprenticeship program that everybody goes through when they come onboard. For each machine there is a three- to six-month training process. For our entry-level technicians, we partner with a local college for basics on machines. We also offer tuition reimbursement for anything related to your job. Even if you are the guy that fixes machines and you want to take an accounting class, we regularly with our employees. Every hourly employee in our company gets a review every four months with their supervisor or manager. And we are good at promoting from within."*

**Figure 8. Type of Training Offered to New Hires or Incumbent Workers in Skilled Trades Positions Over the Last 12 Months**




Percentages add up to more than 100% because respondents could select multiple answers
Note: N Firms responding=143

[3]Job shadowing typically lasts only two weeks and involves pairing up the new hire with an experienced worker who is not officially tasked with training. On-the-job training lasts longer, is more formal, and involves a trainer-trainee relationship to build a broad set of competencies.

*"Completion of our apprenticeship program typically requires three years, but credit is given for past work experience, allowing a participant to complete their apprenticeship in as little as one year. The key concept to apprenticeship is continuous learning throughout one's career, and this mindset has become pervasive through our workforce. I believe offering apprenticeships, on-the-job training, and tuition reimbursement has provided us with recognition in the employment market in our region and increased our applicant pool and contributed greatly to low turnover."*

These comments also show that the commitment to workforce training can help create a culture of continuous learning, which is critical to success in manufacturing. Firms must be able to adapt to rapidly evolving technologies and customer needs. However, these approaches tend to be costly. It is not surprising that small firms are the least likely to offer OJT and tuition reimbursement. They are also least likely to have the organizational capacity to identify training gaps as they emerge, train the trainers, and offer mentorship and career growth opportunities. These firms are the most vulnerable to talent shortages because they have the fewest resources to address them.

## Conclusions and policy implications

Based on in-depth interviews with Minnesota manufacturing employers on 1,072 job vacancies in skilled production occupations, the major findings of this study are summarized below.

* Firms seeking to fill positions in occupations requiring long-term on-the-job training, such as machinists and CNC machinist, in industries that are low-tech, such as metal and food manufacturing, were more likely to cite difficulty filling positions.

* While employers reported general hiring difficulties in 62 percent of vacancies, just 10 percent of all vacancies were hard-to-fill solely because of lack of skills in job applicants. Hiring difficulties were most frequently the result of a mix of skills gaps and undesirable job or firm characteristics. When demand-side issues were cited, undesirable shifts and uncompetitive wages were the biggest barriers, followed by location and ineffective advertising. When skills gaps were cited as a problem, employers pointed out that such skills are more effectively acquired through OJT.

* Sixty-eight percent of hard-to-fill positions attracted very few candidates, with 10 or fewer applications being the norm. Employers attribute this to either general disinterest in production work (an "image problem") or to a combination of skills gaps and undesirable job characteristics that discourage people from applying.

* The measurable characteristics most strongly associated with hiring difficulties were industry sector, occupation, firm geographic location, firm size, turnover, education requirements of a vacancy, and a firm's provision of OJT. The large impact of turnover suggests the presence of a causal relationship between undesirable job characteristics and hiring difficulties. On the other end, the large impact of education requirements demonstrates the existence of skills gaps at the *middle* of the skills range. The skills that employers are having the most trouble finding are taught through vocational/technical training provided either in high school or in college.

* Regardless of the reason for the hiring difficulty, the primary response by employers was to improve advertising methods, followed by making the job more attractive with or without increasing the wage. Enhancing internal training to new hires especially through structured on-the-job training is also gaining considerable traction, especially in combination with strategies aimed at attracting young talent through internships and tuition

reimbursement plans. The combination of internal and external training is increasingly recognized as a best practice for bridging talent shortages. Firms that do not implement these actions often wish they could, but cite resource constraints and fear of poaching from competitors as barriers. It is important to note that the implementation of internal and external training is highly correlated with firm size: small firms are the least likely to be able to afford this approach.

These findings reinforce what stakeholders have known for years: The pipeline problem lies at the root of hiring difficulties in manufacturing. Lack of student interest discourages post-secondary institutions from offering more classes in these fields. High turnover and employee poaching discourage firms from investing in OJT and deprive them of internal candidates to promote. As talent is lost to retirements, the capacity to provide good quality training diminishes. Finally, and just as important, high schools and post-secondary schools are still underutilized sources of new talent, reducing the chances of building the pipeline fast enough to offset retirements. Disincentives to employer-provided training can cause an overall decline in workforce skills across the sector.

Minnesota employers are investing in solutions that can solve the pipeline problem in its various forms. Demand factors are more often acknowledged and addressed, and firms are shifting from a strategy of buying skills from outside to building skills internally by training incumbent and new workers. The supply-side problem cannot be solved with increasing graduation rates post-secondary

programs alone, but rather with a coordinated set of interventions at different levels of the workforce system, including the following:

1. There is an urgent need for the education system to expand opportunities to develop math and mechanical skills. Without a good foundation in these skills, manufacturing employers, especially small firms that rely on a high-school educated talent pool, cannot effectively bring new hires up to speed and train them further. Strengthening math instruction and adding vocational courses at the high school level could help develop these skills and expose students to manufacturing careers.

2. Increased collaboration between employers and technical colleges to offer internships and work-based learning opportunities tailored to the unique needs of a region and industry would be a useful step. Whenever possible, the partnership should involve updating the curriculum with industry-approved competency standards in order to improve the alignment between school offerings and employer needs.

3. Efforts on the part of employers to expand OJT and make skilled production careers more attractive must continue. Results show that OJT is effective in reducing the likelihood of hiring difficulties and suggest that interventions that enhance the capacity to deliver structured OJT through technical assistance make sense. Career explorers must be made aware of the excellent opportunities available in manufacturing, including access to an affordable college education, technical skills acquisition opportunities and the potential for career advancement.

While the challenges outlined in this article and resulting recommendations have been known and discussed for years, finding practical ways to implement and fund effective solutions is still a huge challenge. As technology advances, many of the careers highlighted in this study will require even higher skilled workers. If more job seekers, especially youth, get early exposure to these fields, they will likely see them as pathways to good paying jobs, and a renewed interest in skilled production could emerge as a result.

Luke Greiner

# Connecting Students and Educators to Labor Market Information

*New dashboard provides bridge to Career Wheel to help schools and students make decisions that align with the economy.*

Local labor market information is foundational for creating and aligning educational resources at the secondary and post-secondary levels with the current and future needs of the job market.

For more than four decades, the Standard Occupational Classification (SOC) has been *the* standard for measuring and analyzing occupations in the United States.[1] The SOC hierarchy provides researchers with an excellent model to conduct meaningful research on the economy, but it's not the only way to organize occupations. Educational institutions commonly use a different type of structure, which creates a mismatch, making it difficult to evaluate how well programs and course offerings match the job market.

Minnesota's Department of Education and Minnesota State college systems rely on a framework that connects occupations with educational programs and places them into Career Clusters and Career Pathways.[2] This structure is called the Career Wheel.

In order to bridge the differences between the SOC structure and the Career Wheel structure, DEED has started connecting local labor market information to the occupations organized by the Career Cluster and Career Pathway groups in the Career Wheel. The goal of packaging labor market information in the Career Wheel format is to help our schools and students make decisions that align with the economy. Virtually every school and college in the state is familiar with this format.

Called the Career Pathways Tool, the target audience for this interactive dashboard, created by DEED's Regional Analysis & Outreach Unit is students, school districts, and colleges. It can help answer the following questions for each group:

### *For students:*

- What kind of jobs does each educational pathway lead to?
- How many of those jobs exist in Minnesota, and how much do they pay?
- What are the typical tasks and work activities in each job?

For instance, a student interested in marketing might find it helpful to see current employment numbers and wages for detailed marketing occupations. This can include jobs in sales, merchandising, research, communications, or management. From there, students can assess occupations by how much education beyond high school they require and how much they tend to pay. And by selecting the occupational title, a new tab opens to a short video of a typical 'day in the life' of each occupation.

[1] www.bls.gov/soc/2018/soc_2018_manual.pdf
[2] www.minnstate.edu/system/cte/consortium_resources/documents/POS-Career-Wheel-8x11-2016.pdf

## Career Pathways Tool: Creating Cross-Talk from a Crosswalk

This dashboard (mn.gov/deed/careerpathways) connects educational programming with economic data in an effort to help align educational resources and planning with economic realities.

The primary goal of this dashboard is to help students understand how their educational path matches employment opportunities, and to inform education curriculum, initiatives, and programming. The first tab, "Explore Careers in Your Region" is designed primarily for career exploration with students, parents, and counselors.

The other tabs provide more detailed information for education institutions and partners to evaluate how well their programs, curriculum, and resources align with their regional economy.

***For education institutions and partners:***

- What jobs are in demand in the region?
- How well do current or proposed programs and curriculum match the job market?
- Do local advisory boards accurately represent the opportunities in the region?

For school administrators, colleges, or even economic development organizations working to engage their business community with local education institutions, it is helpful to connect programming with the local economy. A school district or college might be surprised to learn that the business, management, and administration career field has almost five times the amount of employment that health science does in Minnesota. It could also be helpful to understand how educational requirements can be vastly different for the various occupations in each Career Cluster, or to learn what occupations are in highest demand in each Career Cluster and Career Pathway.

The goal of DEED's interactive Career Pathways Tool is to allow students, school counselors and administrators and other partners to use local occupational data to make smart decisions.

Dave Senf

# Minnesota's Record Expansion

*Has Minnesota's employment lagged behind U.S. job growth because our labor demand is lower? Or is labor supply lower? That's the question.*


In July, the current expansion, which started in June 2009, reached 121 months, moving past the 1991-2001 expansion as the longest of the 11 post World War II expansions. Despite its record length the ongoing expansion ranks in the middle of the pack when it comes to wage and salary employment growth in Minnesota and nationally (Figure 1).[1] The largest percent job gain occurred during the 1961-69 expansion, which lasted 109 months, with employment climbing 39 percent in Minnesota and 33 percent in the U.S. Over the boom years of 1991 to 2001, when the state's unemployment rate reached a record low annual average rate of 2.7 percent in 1998, employment expanded by 26 percent in Minnesota and 23 percent nationally. In contrast, employment has increased just 12 percent in Minnesota and 16 percent nationally so far during the current expansion.

Many factors influence the rate of economic and job growth during expansions but one fundamental factor which comes into play as expansions lengthen and unemployment rates decline is the rate of labor force growth. The faster job growth during previous expansions and the slow job growth during the current expansion can to a large

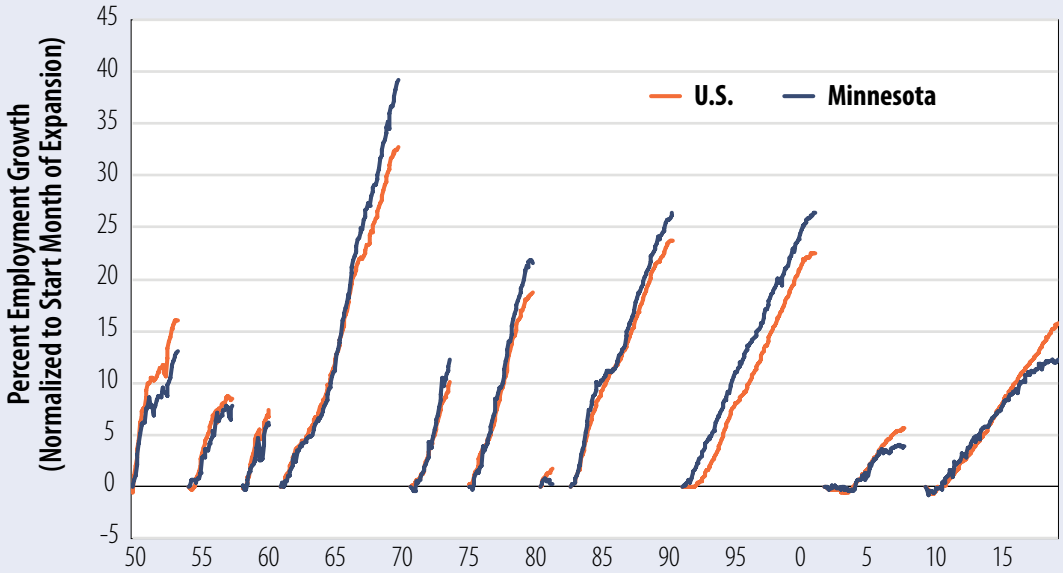
[1]Employment data used here is seasonally adjusted Current Employment Statistics (CES) data which covers non-agricultural wage and salary employment and excludes agricultural wage and salary and self-employed employment.

degree be explained by the entrance of the baby boom generation into the labor force in the 1960s and their exit over the last decade as they retire. Baby boomers are not the whole story. Labor force participation of men has been gradually falling over the last seven decades while the labor force participation of women, after gradually increasing for five decades, began to tail off around 2000. Another important ingredient to labor force growth over the last few decades has been the uptick in immigration to the U.S. and Minnesota.

Minnesota's job growth during the expansions in the 1950s was slightly lower than nationally. During the next six expansions, covering 1960 through 2000, job growth in the state was slightly higher than U.S. job growth except during the one-year expansion in 1980-1981. Minnesota's job growth over the last two expansions, including the current expansion, has lagged national job growth. The net result is that the state's share of U.S. wage and salary employment, after peaking in early 2003, has been slowly declining, pushing the state's share of national employment back to where it was in the early 1990s. Minnesota would have roughly 125,000 (or about 4 percent) more jobs if the state's share of national employment was still at the 2003 level. Minnesota had an estimated 105,000 unemployed workers in June, which implies that if Minnesota's job growth had matched national job growth the state would have an unemployment rate approaching zero if labor force participation held constant and immigration into the state didn't accelerate.

The million-dollar question is this: Has Minnesota's employment lagged behind U.S. job growth because labor demand is lower in Minnesota relative to the U.S. labor demand, or because labor supply in the state is lower relative to most other states' labor supply? Most indicators point toward Minnesota's relatively smaller pool

**Figure 1. Employment Growth During Expansions, Minnesota and U.S., 1950-2019**

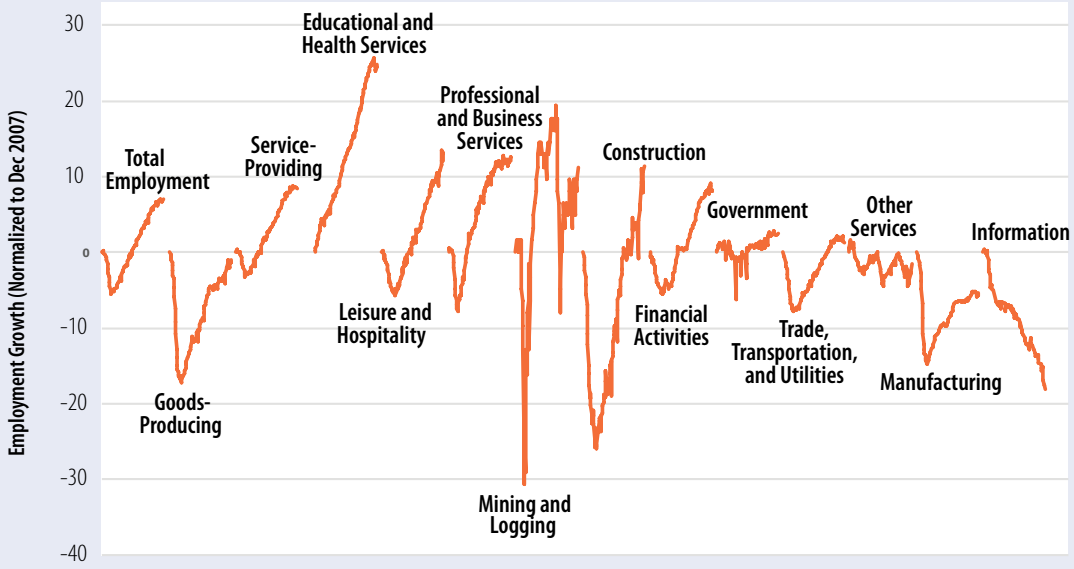



*Source: Current Employment Statistics (CES) monthly seasonally adjusted data*

of workers available for hiring as the most likely culprit rather than weaker labor demand. In 2018 Minnesota had the seventh lowest unemployment rate, the second highest labor force participation rate, the highest employment-to-population ratio and the fifth lowest U-6 unemployment rate. All these measures add up to Minnesota having a relatively small pool of potential workers compared to most states from which workers can be hired to fuel job growth. Minnesota companies have been raising the red flag about the lack of workers to fill jobs for years now. Labor shortages preventing business expansions may have indeed reached a critical level in Minnesota.

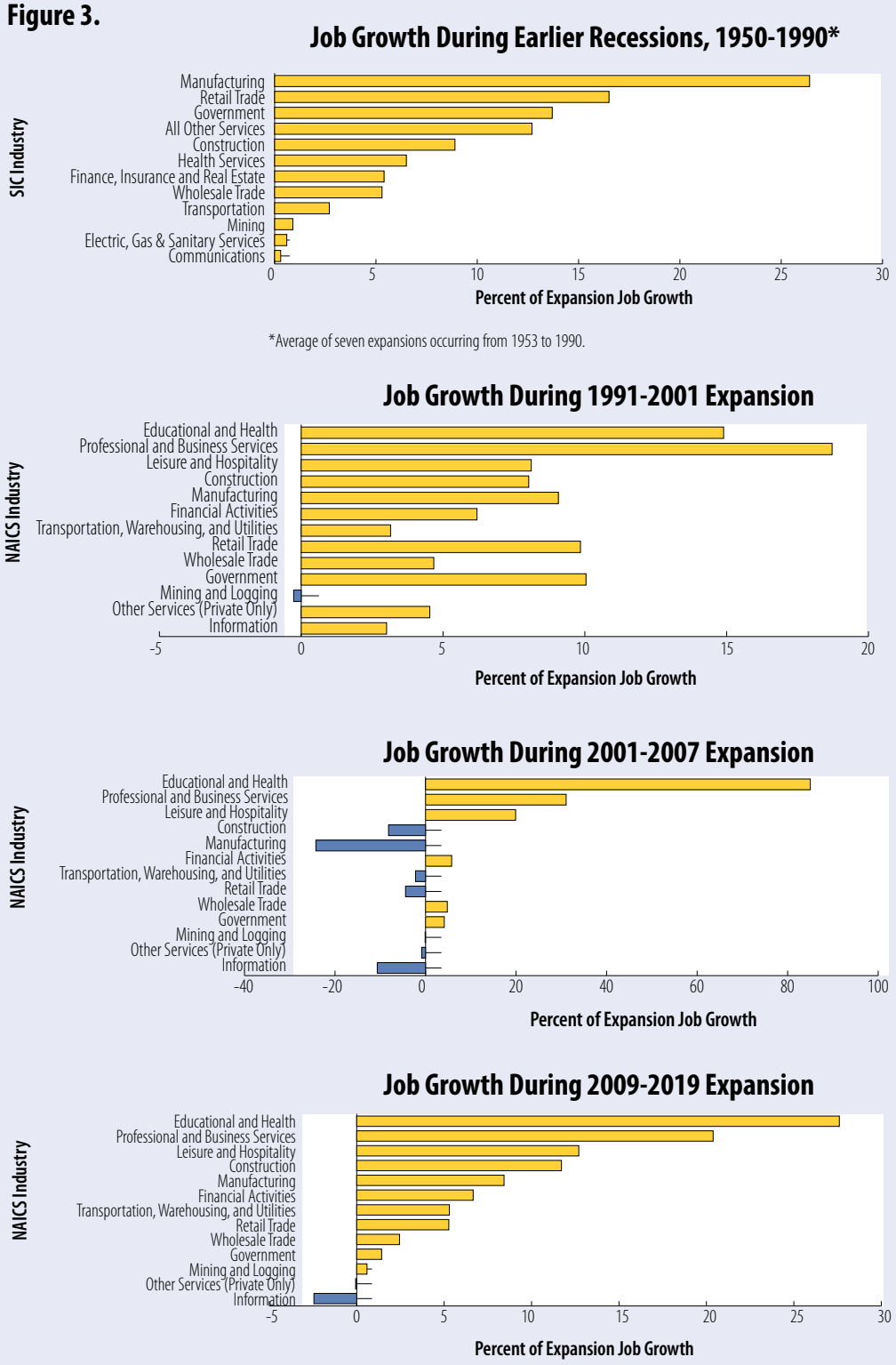
The three most recent expansions have generated 565,000 jobs (1991-2001), 104,000 jobs (2001-2007) and 320,000 (2009-2019). Roughly 91,000 (28 percent) of the jobs created during this expansion have been in the Educational and Health Care Services supersector (Figures 2 and 3). The Professional and Business Services supersector (20 percent) and Leisure and Hospitality supersector (13 percent) have added the next most jobs. The private-public sector split of employment growth has been 97.5 and 2.5 percent private versus public. The Service-Providing sector has accounted for 80 percent of job growth compared to 20 percent for the Goods-Producing sector. Goods-Producing employment is still below its pre-recession level as Manufacturing, which lost 50,000 jobs during the recession, has added only 30,000 jobs during the expansion. The Manufacturing workforce along with Other Services and Information workforces remain below pre-recession levels despite this expansion being the longest in duration. Structural (long-term) factors rather than cyclical (short-term) factors are behind the slow or negative job growth in these sectors.

**Figure 2. Minnesota Employment Growth by Supersector, Dec 2007 - June 2019**



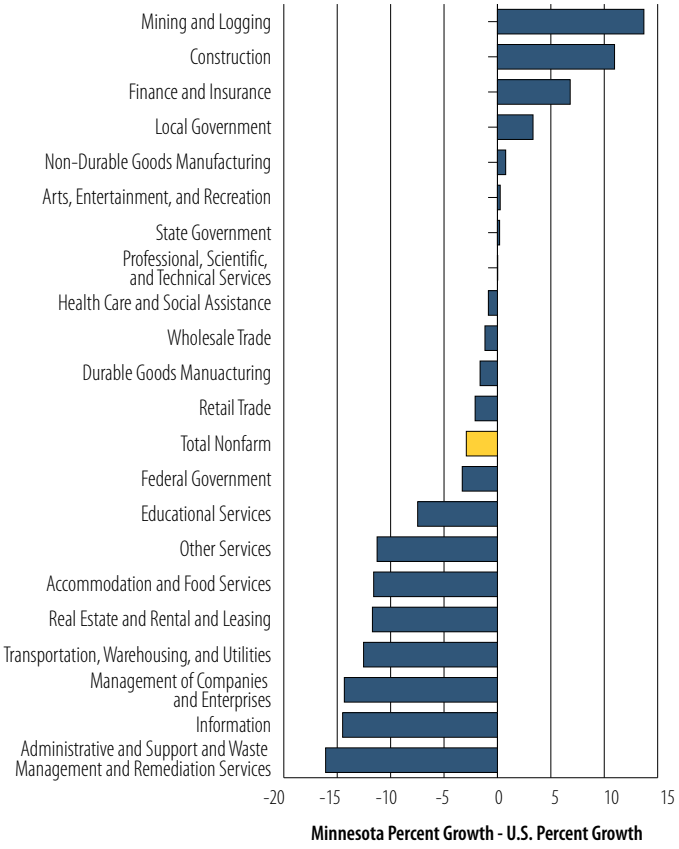

*Source: Current Employment Statistics (CES) monthly seasonally adjusted data*

**Figure 3.**




*Source: Current Employment Statistics (CES). LMI office calculations. The first chart, covering 1950 – 1990 expansions uses CES data organized by the SIC scheme. The other three charts, covering expansions since 1990 use CES data organized by the NAICS scheme*

**FIgure 4. Minnesota Relative Employment Growth by Sector Over 2009-2019 Expansion**




*Source: Current Employment Statistics (CES). Percent growth based on 12-month average of July 2009-June 2010 and July 2018-June 2019*

Robust Manufacturing job growth used to be the norm during expansions as workers laid off during recessions would be hired back as expansions gained steam. Manufacturing hiring was the largest component of job creation during expansions prior to 1990, accounting for 26 percent of all job growth on average during the seven expansions between 1950 and 1990 (Figure 3).[2] The robust hiring during expansions boosted Manufacturing employment above pre-recession levels during every expansion except for the last two. Globalization and offshoring of Manufacturing, as well as scarcity of workers, since the 1990s has limited the size of Manufacturing job rebounds in the last two expansions. Retail Trade and Government payroll expansions, unlike during more recent expansions, were the second and third largest source of job growth during earlier expansions.

The record length of this expansion has generated job growth across more sectors than during the 2001-2007 expansion. Eleven of the 13 sectors have added jobs since 2009 while only six sectors expanded payroll numbers during the 2001-2007 expansion. Manufacturing, Financial Activities, Transportation, Warehousing and Utilities, and Retail Trade have all added jobs during this expansion after having reduced jobs during the previous one.

Minnesota's slower than national job growth during the current expansion is spread across a number of sectors as only six out of 21 more-detailed sectors in Minnesota have added employment faster than their national counterparts during the current expansion.[3] Mining and Logging jobs in Minnesota have climbed by 25 percent since 2010 versus 11 percent in the U.S. (the net difference is shown as 14 percent in Figure 4). Only three other sectors have had significantly faster job growth than the national rate: Construction; Finance and Insurance; and Local Government. Local Government employment nationwide has been flat over the last decade while increasing by 4 percent in Minnesota, with most of the job expansion coming in local government education in Minnesota.

Employment growth in eight Minnesota sectors over the expansion has been significantly slower compared to sectoral national job growth. It may be hard to believe given the number of eating places that have opened in the Twin Cities metro area

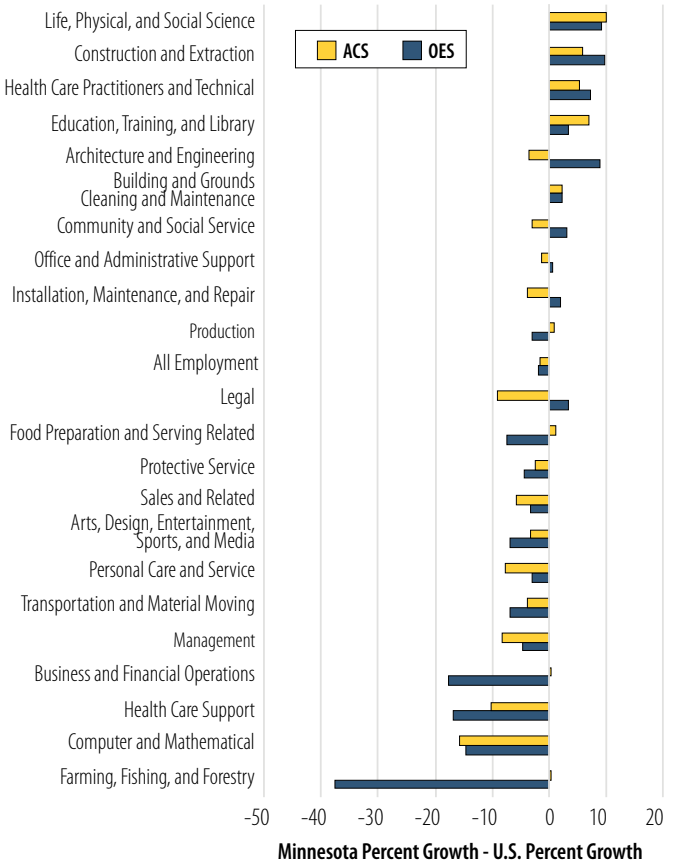
[2]CES employment data underwent a major overhaul in 2001 when the Standard Industrial Classification (SIC) system was replaced with the North American Industry Classification (NAIC) system. Average employment gains during the seven expansions before 1990 utilize the SIC system while the last three expansion utilize the NAICS in Figure 3. The two systems are not strictly comparable but are similar enough to show how the job growth during expansions has shifted across sectors.
[3]Figure 3 is based on CES average employment data for July 2009-June 2010 and July 2018-June 2019.

over the last decade that job growth in Minnesota's Accommodation and Food Services sector since 2009 falls far short of growth nationally. But that is what the numbers show as Minnesota's Accommodation and Food Services sector employment expanded by 16 percent over the last decade compared to 27 percent nationwide. Administrative and Support employment has the largest Minnesota and U.S. job growth gap with jobs in this sector increasing by 14 percent in Minnesota and 30 percent nationwide over the expansion. The gap can mainly be traced to the 37 percent employment increase in the U.S. employee services industry (temporary help services) versus the 17 percent increase in Minnesota's employee services industry.

Figure 4 shows the Minnesota-U.S. job growth rate differences across sector over the current expansion. Figure 5 transfers sector (industry) employment to occupational employment and shows the Minnesota-U.S. occupational job growth rate differences across major occupational groups that occurred over the last decade.[4] Two occupational employment data sources are shown, and the two sources don't always tell the same story for two reasons. One reason is that one source includes self-employment (ACS) while the other excludes self-employment (OES). The other reason is that ACS data comes from household (employees) surveys; OES data are based on employer surveys.

Both data sources report the same Minnesota-U.S. difference trend for slightly more than half of the major occupational groups. For example, job growth for Minnesota's computer and mathematical occupational group over the expansion has been 15 and 16 percentage points smaller than nationwide as reported by the OES (34 percent U.S. growth and 19 percent Minnesota growth) and ACS (37 percent U.S. growth and 21 percent Minnesota growth) data respectively. Jobs in construction and extraction occupations on the other hand have grown by 10 and 6 percentage points more in

**Figure 5. Minnesota Relative Employment Growth by Major Occupational Group Over 2009-2019 Expansion**




*Source: Occupational Employment Statistics (OES) and American Community Survey (ACS). OES data is 2010-2018 and ACS data is 2010-2017*

Minnesota than the U.S. according to OES and ACS data since 2009. For the other eight occupational groups the Minnesota versus U.S. occupational growth difference during this expansion is not distinctly apparent as the two data sources show conflicting relative growth.

Just as no two recessions are alike, no two expansions are alike either. The ongoing expansion in Minnesota has generated smaller job expansion relative to the U.S. than past expansions. Minnesota, along with other states with low unemployment rates and relatively slow job growth, is likely a harbinger of slower job growth across the U.S. as labor shortages spread across the country.

[4]Occupational employment data used in Figure 5 is Occupational Employment Statistics (OES) data for 2010 and 2018 and American Community Survey data for 2010 and 2017.

Dave Senf

# Diffusion to Clear Up Confusion

*Diffusion indexes tell us about employment change across industries.*

Each month the Bureau of Labor Statistics (BLS) releases the Employment Situation Summary which is widely followed primarily for the latest monthly U.S. payroll employment and unemployment rate estimates.[1] A ton of other monthly labor market measures are also released in the report (27 tables of data are published each month) including the Diffusion Index.[2] There are actually two diffusion indexes listed, the Total Private Index (258 industries) and the Manufacturing Index (76 industries).

The two diffusion indexes measure the dispersion of employment change across industries each month.[3] Each industry is assigned a value of 0, 50, or 100 percent, depending on whether industry employment decreased, stayed the same, or increased over the month. The average across industries is then calculated to produce the diffusion index. Diffusion indexes can vary between 100 and 0, with 100 indicating that employment in every industry increased over the month and 0 indicating that all industries lost employment. A 50 percent index indicates an equal balance between industries with increasing and decreasing employment.

Diffusion indexes are derived for many economic and financial statistics including stock prices. A high stock diffusion index signals that the underlying strength of the stock market is strong since more stock prices are advancing than retreating. The same goes for employment-based diffusion indexes. A higher employment diffusion index indicates that employment growth is widespread across industries while a lower index indicates that employment growth is scattered across fewer industries.

Two time periods might have the same overall rate of employment growth but during one period most industries added jobs while during the other period only a few industries added jobs. Tracking the diffusion number alongside aggregate employment growth adds insight into the strength and direction of employment growth.

Figure 1 displays 12-month diffusion indexes for Minnesota (64 industries) and U.S. (258 industries) private employment from January 1991 through June 2019.[4] Recession periods are shaded in the figure since diffusion indexes can help identify economic turning points. Diffusion indexes usually climb during expansions while declining diffusion values appear when economic growth slows. Employment diffusion values below 50 occur during recessions.

Minnesota's diffusion index has generally tracked the national index over the last three decades, but there have been extended periods when Minnesota's index diverged from the U.S. index. The Minnesota

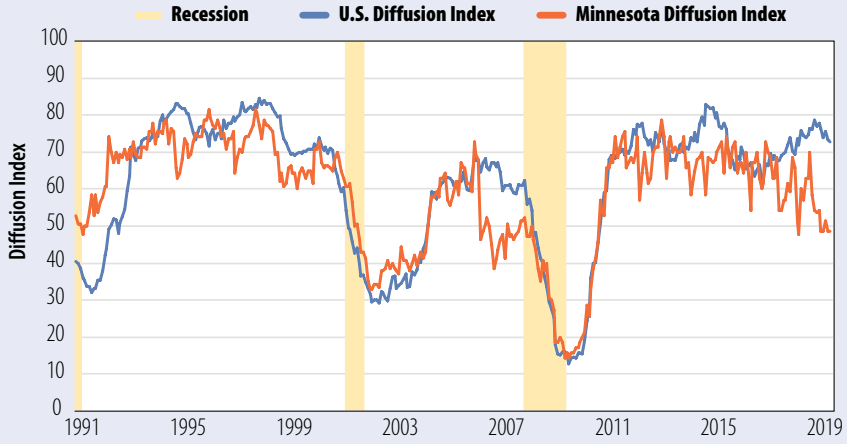
[1] www.bls.gov/news.release/empsit.nr0.htm
[2] The index is at the bottom of the Employment Situation Summary Table B – www.bls.gov/news.release/empsit.b.htm
[3] Additional Employment diffusion indexes are available at the BLS website that compare employment change over three, six and 12 months.
[4] Greater industry details are available nationally rather than at the state level since the survey used to estimated monthly payroll employment numbers is designed to generate statistically valid national estimates.

index briefly fell below 50 during the 1990-91 recession but quickly rebounded over the next two years as job growth was more widespread in Minnesota than nationally. Both indexes began to decline a few months before the 2001 recession but didn't fall below 50 until after the recession was later designated to have started.

Minnesota's index took a noticeable plunge in early 2006 and was below 50 for most of 2007 even though the 2007-2009 recession didn't officially start until December 2007. Minnesota's housing bust occurred a year earlier than nationally and resulted in declining employment in construction and construction-related industries. During the 2001 recession 35 percent of Minnesota industries were still adding workers compared to less than 15 percent during the 2007-2009 recession.

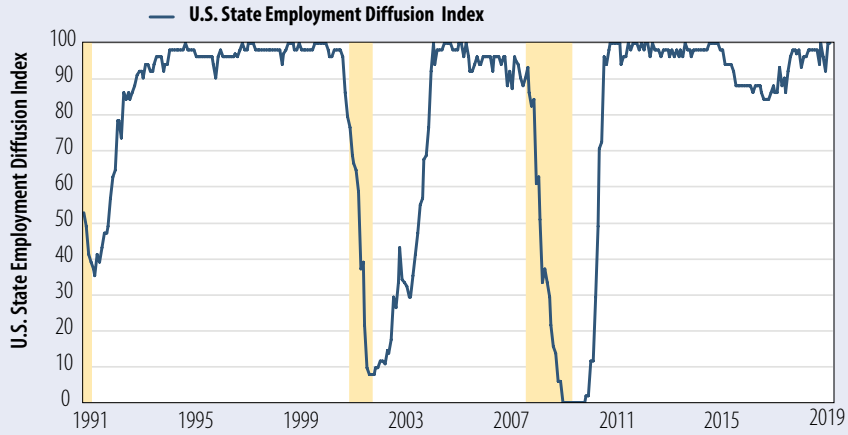
Minnesota's index has slipped significantly below the national index over the last two years and has been below 50 for four of the first six months in 2019. Is the index signaling a recession in Minnesota? Probably not since the industrial employment estimates from October 2018 to June 2019 are subject to benchmarking (revisions) next March.[5] Employment levels for those nine months are likely to be revised upward for a number of industries

**Figure 1. 12-Month Employment Diffusion Indexes, Jan 1991 - June 2019**




*Source : Bureau of Labor Statistics (BLS) and Minnesota Labor Market Office calculations using Current Employment Statistics (CES) data.*

**Figure 2. U.S. State Employment Diffusion Index, Jan 1991 - May 2019**




*Source : Bureau of Labor Statistics (BLS) and Minnesota Labor Market Office calculations using Current Employment Statistics (CES) data.*

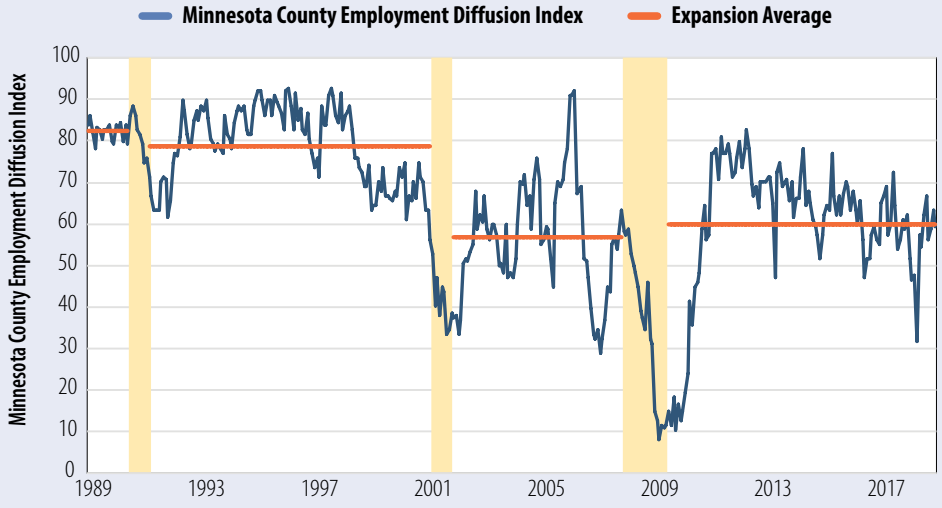
[5]For more on benchmarking CES to QCEW employment estimates, see mn.gov/deed/newscenter/publications/review/april-2019/benchmarking-overview.jsp.

which will push the diffusion index above 50. Caution should be used when evaluating the health of Minnesota's economy using real-time data that will be revised later.

Last year the BLS started to publish another set of employment diffusion indexes that measure how widely national employment growth is spread across states and Metropolitan Statistical Areas (MSAs).[6] The state employment index is displayed in Figure 2. The dip in the index in 2015-16 reflects employment decline in a number of oil-producing states when oil prices tailed off to $40 per barrel. The most current diffusion index readings show that job growth is occurring across almost all states.

Figure 3 reproduces the BLS state employment index but uses county employment totals across Minnesota instead of state employment. The Minnesota County Employment Diffusion Index measures how widely county employment changes are spread across the state. County diffusion levels were much higher during the 1980s and 1990s than over the last two decades. The downward trend in the index is a handy measure of how job growth in the state has become more concentrated geographically over the last 40 years. Just under 80 percent of Minnesota counties were adding employment in the 1991-2001 expansion compared to 60 percent of counties during the current expansion. The decline in job growth in some areas of Minnesota reflects slowing or declining labor force growth in those areas and is most likely a harbinger of job growth becoming even more concentrated in the state in the future.

**Figure 3. Minnesota County Employment Diffusion Index, Jan 1988 - Dec 2018**




*Source: Minnesota Labor Market Information Office calculations using Quarterly Census of Employment and Wages (QCEW) data.*

[6]More information is available at www.bls.gov/sae/research/experimental-series/ces-experimental-diffusion-index-data-series-for-states-and-metropolitan-statistical-areas.htm.

Sanjukta Chaudhuri

# Snapshot: Minnesota's Construction Industry

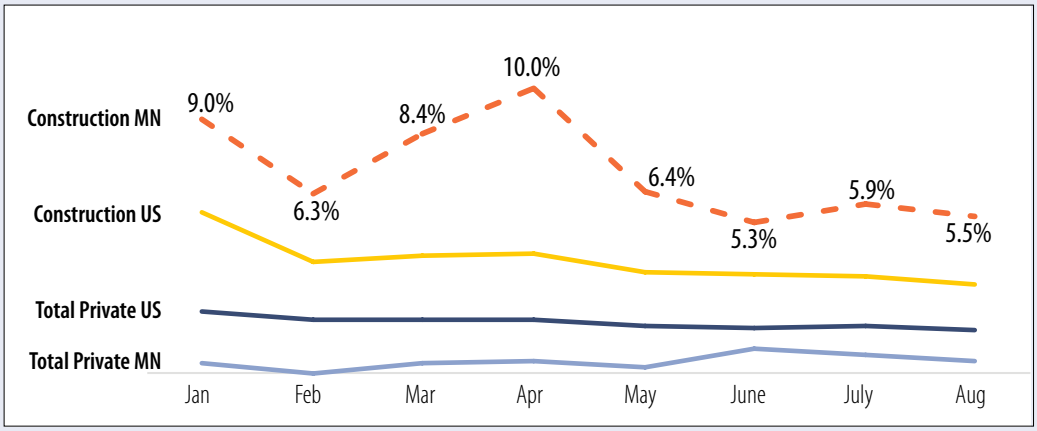
*Diverse workers will be critical to the industry's survival and growth.*

Construction has been an engine of job growth in Minnesota since 2011. The level of construction activity is an important indicator of economic conditions, with more construction and building permits indicative of a strong economy. Falling construction activity is usually deemed an early indicator of an economic downturn. Residential building permits is one indicator used in DEED's Economic Index. This snapshot looks at how Construction has fared in Minnesota this year.

Construction is projected to grow 8.9 percent by 2026, according to DEED's Employment Outlook data tool. The Construction workforce tends to be younger and male-dominated (87.6 percent male). In 2018, over 63 percent of Construction employees were age 19-44 years, compared to 59 percent for the private sector. Construction jobs generally require a high school diploma or post-secondary certificate for entry. As a result, educational attainment of construction employees is lower than across the private sector. Fifty-five percent of Minnesota's Construction workforce has some college or more compared to 64 percent across the total workforce.

In August, 144,575 workers were employed in the Construction sector, or slightly under 5 percent of total non-farm employment. Over the year, Construction has grown faster than any other sector in Minnesota, up 5.5 percent in August. Construction in Minnesota has also outpaced the U.S. in over-the-year growth throughout 2019 (Figure 1).

**Figure 1. Over-the-Year Change in Employment, Construction and Total Private Sector, Minnesota and U.S., 2019 through August**



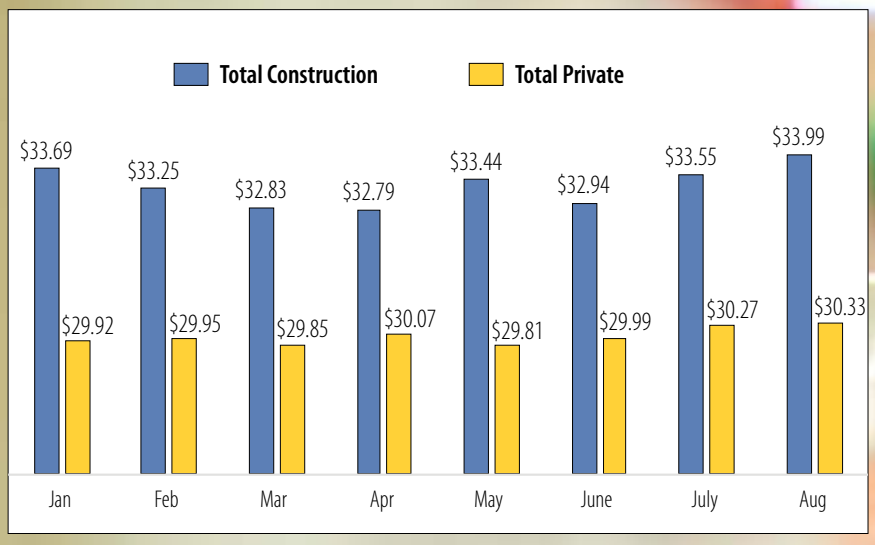

*Source: DEED Current Employment Statistics*

Wages in Construction were far above average at $33.99 compared to $30.33 across all private sector jobs in August (Figure 2). Construction employees worked an average of 41.1 hours per week in August, in contrast to 34.1 hours across the private sector.

Looking at constituent industries, Residential Construction grew in all months of 2019, and most recently grew by 2.3 percent over-the-year in August. Heavy and Civil Engineering, which has had a mixed year so far, declined by 5.4 percent over-the-year in August. Specialty Trade Contractors has had unadjusted growth in jobs every month so far in 2019, with over-the-year growth of 9.4 percent in August.

While the outlook for Construction is positive, the sector is highly sensitive to business cycles. A recession would likely negatively affect Construction. Construction needs to diversify its workforce by recruiting more women and minorities to fill open positions during the tight labor market that Minnesota is experiencing. Diversifying the workforce will most certainly turn out to be a critical survival and growth strategy for Construction.

**Figure 2. Average Weekly Wage, Construction and Total Private Sector, Minnesota, 2019 through August**




*Source: DEED Current Employment Statistics*

Meet

# THE WRITERS

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